United States Department of the Interior

NATIONAL PARK SERVICE
Great Basin National Park
Baker, Nevada 89311-9701

IN REPLY REFER TO:

N3615 (2350)

January 9, 2008

Francisco Vega
Nevada Division of Environmental Protection
Bureau of Air Pollution Control
901 S. Stewart St., Suite 4001
Carson City, Nevada 89701

Dear Mr. Vega:

The proposed Sierra Pacific Resources (SPR) Ely Energy Center (EEC) project would be located in White Pine County, Nevada. The facility would consist of two new 750 MW supercritical dry-bottom Pulverized Coal (PC) boilers near Ely, 63 km northwest of Great Basin National Park (NP), a Class II air quality area managed by the National Park Service (NPS), and 250 km northwest of Zion NP, a Class I air quality area managed by the NPS. Emissions from this project have triggered PSD review for pollutants which could impact Air Quality Related Values (AQRVs) at Zion and Great Basin National Parks. Due to the size of the EEC project and its location with respect to Great Basin NP, these impacts would exceed many of our significance criteria (namely air quality, water quality, viewsheds and dark night skies). Therefore, in accordance with our Organic Act responsibilities and internal Management Policies, the expected impacts upon AQRVs at Great Basin NP would be unacceptable. The enclosed technical review explains concerns about impacts to both National Parks in more detail.

Because I represent Great Basin NP, my comments will focus upon this special place and NPS concerns about the environmental impacts that may result from location of such a large pollution source so near by. The National Park Service fully supports the wise economic development of White Pine County and eastern Nevada and submits the following comments in order to provide you with contextual information needed to make a wise decision.

Great Basin National Park was established by Congress, with the strong support and leadership from the citizens of Nevada, to preserve a stunningly beautiful part of the nation's natural heritage. One of the primary reasons for establishment of the park related to the significant scenic values in and around the park. This point is further reflected in the Nevada Revised Statutes (NRS 445B.100) that declares preservation of visibility and scenic values as public policy for the State of Nevada.

Visibility

Nationwide studies indicate that the intermountain West enjoys the best visibility in the coterminous U.S., from the southern Cascades, eastward across the Great Basin and Snake River Plain, to the northern Colorado Plateau and central Rocky Mountains. Great Basin NP, which is located in the middle of this region and has been monitoring visibility since 1982 and is known as having some of the best air quality of any National Park site in the lower 48 states—something of which the citizens of White Pine County and the State of Nevada can be proud.

Like a clean white page, the relatively clear air in the Great Basin can be marred easily. Studies of the effect of visibility on park visitors show that slight increases in air pollution are much more distinct and objectionable when and where the air is cleanest. At Great Basin NP, visibility declines after periods of sustained northeasterly winds, when a brown-yellow haze appears in Snake Valley, obscuring the mountains east of the park. Presumably the pollution comes from the Salt Lake City area and the Intermountain Power Plant near Delta, Utah. Fortunately, winds are seldom northeasterly for long periods. If similar pollution sources were built to the west, the park's visibility would be affected more frequently.

White Pine County's night skies are among the darkest in the country. Two-thirds of Americans cannot see the Milky Way from their backyards and nearly all live in places with measurable light pollution. Dark night skies, for the first time in history, are becoming an extinct phenomenon. Researchers predict that at the current rate of increasing light pollution, by 2025 no dark skies will remain in the continental United States. Air pollution decreases night sky visibility, just like it does in the daytime. Air pollution particles increase the scattering of light in the atmosphere, increasing sky glow.

Issuance of a permit for the levels of emissions predicted in the proposed project would compromise visibility at Great Basin National Park and White Pine County.

Acid Deposition

Acid deposition harms aquatic and terrestrial life through direct contact and by changing the chemistry of surface water and soils. It can affect plants' seed germination and survival. Even dry acid deposition builds up on hairy surfaces of desert plants. Later dew or precipitation dissolves the deposition to form concentrated acid solutions that can harm foliage. Acid deposition is often accompanied by nitrogen deposition, which is an artificial fertilization which can favor certain plants over others and change the plant community structure. In addition, sulfates and other components of acid deposition are among the leading contributors to reduced visibility in the United States.

Acid deposition occurs when sulfur dioxide (SO_2) and nitrogen oxide (NO_x) gases chemically change to sulfuric and nitric acid in the atmosphere and fall to the earth with rain and snow (wet deposition), or with dust and microscopic particles (dry deposition). Coal-fired power plants and smelters are the chief sources of SO_2 emissions; automobiles and electric utilities are the chief source of NO_x emissions.

All of the lakes in the park are highly susceptible to acidification, should acid deposition occur. The granitic and quartzitic basins occupied by these lakes, combined with their high elevations, leave them with very little capacity to neutralize acidic pollutants.

Great Basin National Park and White Pine County enjoy outstanding air quality most days due to their distance from major pollution sources and location in regard to prevailing winds from urban areas. However, just a small increase in pollution can greatly affect the park's visibility and natural resources. The issuance of the permit proposed by the Ely Energy Center would compromise the park’s air quality, water quality and viewsheds and dark night skies.

While we appreciate that the Nevada Division of Environmental Protection has extended the public comment period, we are providing these comments at this time to facilitate the process, and may submit additional comments later. Please note that we still have several unresolved issues regarding the modeling analyses (lack of information, cumulative increment and visibility analyses), the proposed design and emissions control technology, the project’s potential air quality impacts at Great Basin and Zion National Parks, as well as a major procedural problem. It is our perception that the issuance of this permit is premature given that the analysis and disclosure of environmental impacts has not been completed by the Bureau of Land Management. We are also concerned about the cumulative impacts of this and the White Pine project upon these national parks. If you have any questions, please feel free to contact Don Shepherd of my staff at 303-969-2075.

Sincerely,

/s/ Paul DePrey
Superintendent, Great Basin National Park

Enclosure

National Park Service
Comments on the Ely Energy Center Power Plant
Prevention of Significant Deterioration Permit Application
January 9, 2008

Background

The proposed Sierra Pacific Resources (SPR) Ely Energy Center (EEC) project would be located in White Pine County, Nevada. The facility would consist of two new 750 MW supercritical dry-bottom Pulverized Coal (PC) boilers near Ely, 63 km northwest of Great Basin National Park (NP), a Class II air quality area managed by the National Park Service (NPS), and 250 km northwest of Zion NP, a Class I air quality area managed by the NPS. Coal to fuel the facility will be transported by rail from the Powder River Basin in Wyoming, and we understand that electricity will be sent southward toward Las Vegas and vicinity. The EEC main boiler facility would be a major source of sulfur dioxide (SO_2 = 4,578 tons per year (TPY)), nitrogen oxide (NO_x = 4,578 TPY), particulate matter (PM_{10} = 1,679 TPY), and sulfuric acid mist (H_2SO_4 = 305 TPY).

This proposed permit would be issued under the Prevention of Significant Deterioration of Air Quality Program (PSD). The purposes of the PSD program include to “preserve, protect and enhance the air quality in national parks, wilderness areas and other areas of natural, recreational, scenic or historic value” and “insure economic growth will occur in a manner consistent with the preservation of existing clean air resources.” 42 U.S.C. 7470. In other words, the purpose of the PSD program is to manage growth in the context of environmental protection. For this permit application, the environmental protection context includes consideration of impacts on Great Basin and Zion National Parks. The Clean Air Act gives the Federal Land Manager (FLM) an affirmative responsibility to protect air quality related values of Class I areas, like Zion NP.

Please note that, under the Clean Air Act, the FLM has no formal role in the permitting process except to the extent a proposed new or modified source may affect Air Quality Related Values (AQRVs) in a Class I area. Nevertheless, the National Park Service's mission was established long before the Clean Air Act and is:

> "to conserve the scenery and the natural and historic objects and the wildlife therein [within the national parks] and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." (National Park Service Organic Act of 1916)

We therefore have responsibilities under NPS’s Organic Act to protect AQRVs in Class II Federal areas. The information and procedures outlined in our Federal Land Managers Air Quality Related Values Work Group (FLAG)1 document are generally applicable to evaluating the effect of new or modified sources on the AQRVs of Class II areas managed by the NPS.

Great Basin National Park is one of 391 units administered by the NPS, and one of 54 national parks. Great Basin NP was established in 1986 by PUBLIC LAW 99–565–OCT. 27, 1986 100 STAT. 3181 which states:

> SEC. 2. (a) In order to preserve for the benefit and inspiration of the people a representative segment of the Great Basin of the Western United States possessing outstanding resources and

[1] Information on our FLAG document can be found at: http://www2.nature.nps.gov/air/permits/flag/index.cfm

> significant geological and **scenic values** (emphasis added), there is hereby established the Great Basin National Park thereinafter in this Act referred to as the "park").

Although Great Basin is not a Class I area,[2] NPS policies provide for protection of all areas for which we are responsible.

We understand that the State of Nevada and its Environmental Commission also has a statutory interest in protecting air quality in general, and visibility, in particular. From the Nevada Revised Statutes:

> NRS 445B.100 Declaration of public policy.
>
> 1. It is the public policy of the State of Nevada and the purpose of NRS 445B.100 to 445B.640 , inclusive, to achieve and maintain levels of air quality which will protect human health and safety, prevent injury to plant and animal life, prevent damage to property, and preserve visibility and scenic, esthetic and historic values of the State.

As discussed below, we believe that the EEC may injure plant and animal life, damage property, and impair visibility and scenic, esthetic and historic values in Great Basin NP.

Nevada defines air pollution as contaminants that "limit visibility or interfere" with scenic values. (NRS 445B.115(2)). The State Environmental Commission may adopt regulations consistent with the general intent to prevent, control or abate air pollution (445B.210(1)); and "establish such requirements for the control of emissions as may be necessary to prevent, abate or control air pollution." (445B.210(5)).

Similarly, the Nevada Department of Conservation and Natural Resources shall:

> "Make such determinations and issue such orders as may be necessary to implement the purposes of NRS 445B.100 to 445B.640, inclusive" (445B.230(1); and "Take such action in accordance with the rules, regulations and orders promulgated by the commission as may be necessary to prevent, abate and control air pollution" (445B.230(11)). And, "In carrying out the purposes of NRS 445B.100 to 445B.640, inclusive, the Department may, if it considers it necessary or appropriate:
>
> **1.** Cooperate with appropriate federal officers and agencies of the Federal Government, other states, interstate agencies, local governmental agencies and other interested parties in all matters relating to air pollution control in preventing or controlling the pollution of the air in any area.
>
> (and)
>
> **4.** Develop measures for control of air pollution originating in the state (445B.235).

We believe that the Nevada Division of Environmental Protection (NDEP) therefore has both the obligation and the authority to prevent impairment of visibility and degradation of other natural resources in Great Basin NP.

We offer the following comments based on information available as of January 9, 2008. We may present additional comments prior to the close of the comment period.

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[2] Great Basin National Park was established by Congress in 1986. At 77,000 acres, its size far exceeds the 6,000 acres threshold for designation as a Class I area. Had Great Basin been a national park at the time of passage of the 1977 Clean Air Act Amendments, it would have been a mandatory Class I area.

Best Available Control Technology (BACT) Analysis

Based on the review and analysis of the material received, we believe the proposed emissions from the EEC facility would significantly impact resources at Great Basin NP and Zion NP. (Please see the discussion below.) Therefore, it is important that impacts at these National Parks be lessened. We believe that the EEC facility could achieve lower emission limits by choosing an inherently cleaner coal-based technology, or by making more effective use of the control technologies chosen for the PC boiler. Please note that it is generally understood that a source impacting a National Park is held to a higher standard and may be required to install additional controls or take additional operational measures to minimize impacts at these national treasures.

BACT definition and process: BACT applies to any pollutant for which there would be a significant net increase in emissions. BACT is defined as

> **an emissions limitation** (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Clean Air Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, **including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant**… (emphasis added)

It is important to note that, because BACT is an emission limit, that emission limit can be set by the permitting authority without actually specifying the design of the emission source that is to meet that limit. Thus, a permitting authority has the power to set an emission limit that it has judged to represent BACT for a broad source category, and then allow the applicant the freedom to determine how to meet that emission limit. According to the New Source Review Workshop Manual (NSRWM):

> Historically, EPA has not considered the BACT requirement as a means to redefine the design of the source when considering available control alternatives. For example, applicants proposing to construct a coal-fired electric generator, have not been required by EPA as part of a BACT analysis to consider building a natural gas-fired electric turbine although the turbine may be inherently less polluting per unit product (in this case electricity). **However, this is an aspect of the PSD permitting process in which states have the discretion to engage in a broader analysis if they so desire. Thus, a gas turbine normally would not be included in the list of control alternatives for a coal-fired boiler. However, there may be instances where, in the permit authority's judgment, the consideration of alternative production processes is warranted and appropriate for consideration in the BACT analysis. A production process is defined in terms of its physical and chemical unit operations used to produce the desired product from a specified set of raw materials. In such cases, the permit agency may require the applicant to include the inherently lower-polluting process in the list of BACT candidates.** (emphasis added)

So, a permitting authority does have "the discretion to engage in a broader analysis."

Clean Coal Technologies: One of the fundamental principles of pollution control is to minimize the amount of pollution generated in the first place. According to the NSRWM:

> The first step in a "top-down" analysis is to identify, for the emissions unit in question (the term "emissions unit" should be read to mean emissions unit, process or activity), all "available" control options. Available control options are those air pollution control technologies or techniques with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. **Air pollution control technologies and techniques include the application of production process or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of the affected pollutant.** This includes technologies employed outside of the United States. **As discussed later, in some circumstances**

> **inherently lower-polluting processes are appropriate for consideration as available control alternatives.** (emphasis added)

We believe that a technological solution is now available that would allow use of coal to generate electricity without the large quantities of emissions associated with pulverized coal-fired boilers. Integrated Gasification Combined Cycle (IGCC) is a rapidly-developing technology that has now been demonstrated by Tampa (FL) Electric at its Polk Generating Station to be clean, reliable, and economical.[3] Because this technology is developing so rapidly, SPR's criticisms of IGCC that are based upon 2006 information and pronouncements[4] have been overtaken by current events. With the problems of reliability addressed by operating experience and inclusion of redundant equipment, and with major vendors providing complete, integrated systems, reliability should continue to improve.

Although IGCC is currently 10% to 20% more expensive to build than an equivalent PC facility, energy industry experts[5] contend that that cost disadvantage will be partially or entirely offset when national legislation requires carbon dioxide (CO_2) capture and sequestration.[6] While switching to IGCC would not reduce the millions of tons of CO_2 produced by the EEC facility every year, those millions of tons would be concentrated in the IGCC exhaust by a factor of 10 to 100 times smaller than the exhaust from a PC, thus reducing the inevitable cost of capture by one – two orders of magnitude. And, in addition to the advantages in capturing CO_2, a well-controlled IGCC facility would emit far less of the conventional pollutants (SO_2, NO_x, PM_{10}) than conventional PC units, as well as facilitating mercury capture and using far less water.

Furthermore, energy industry leaders such as General Electric have recently acquired the capability to build a complete 600 MW IGCC facility, for the first time bringing all the components of IGCC together in an integrated and cost-effective package. GE expects this approach alone will reduce the IGCC capital cost "penalty" to no more than 10%.

While it is true that no IGCC has yet been successfully demonstrated using western sub-bituminous coal, the inherent flexibility of the IGCC process gives it the ability to use a wide variety of feedstocks.[7] IGCC opponents often cite the loss of turbine efficiency as altitude increases as an insurmountable obstacle. However, this loss is only a few percent per thousand feet and has not prevented electricity generators from building new gas-fired combustion turbines on the Colorado Plateau. Recognizing these benefits, some western states (CO, WY, and MT) have adopted policies to promote IGCC projects.

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[3] At a 2006 workshop in Denver on clean coal technology, a representative of Tampa Electric related that the Polk IGCC is now its most reliable unit in its system and is dispatched first because it is also the most economical.

[4] As a result of a legal settlement, EPA has withdrawn its objection to inclusion of IGCC in BACT analyses.

[5] "IGCC 101" presentation by Steve Jenkins, CH2M HILL at Colorado's New Energy Economy Conference, October 30, 2007, Denver, CO (http://www.dora.state.co.us/puc/projects/NewEnergy/PathForward/PF10-30-07SJenkins-CH2M_IGCC101.pdf)

[6] See NARUC resolution at http://www.naruc.org/Resolutions/ERE1%20Resolution%20on%20State%20Regulatory%20Policies%20Toward%20Climate%20Change.pdf

[7] According to Jenkins, IGCC can use any type of coal, as well as biomass. There is an IGCC in Sweden using chicken litter.

We have received applications for seven proposed IGCC facilities[8] and their relative emissions (in terms of lb/MWh_{net} for SO_2, NO_x, and filterable PM_{10} and in lb/GWh_{net} for mercury) are shown in Figure 1 (attached) along with EEC. It is clear that IGCC is a cleaner coal-to-energy technology than the conventional PC boiler technology proposed by SPR.

In summation, while a state is not required to consider IGCC, it may do so, as has been demonstrated by New Mexico in its evaluation of the Mustang power plant, and by Illinois regarding the Indeck-Elwood project. All things considered, we believe it is time for new power generators to take a serious look at the sorts of "Clean Coal Technologies" being promoted by our administration as it seeks to relieve our dependence upon foreign energy sources while protecting our environment. We also believe that the benefits of IGCC outweigh its costs and that IGCC is a leading candidate for that role, and should be considered by EEC. Since facilities such as EEC will likely be operating for the next 60 years or more, we believe Nevada Division of Environmental Protection (NDEP) should re-consider and re-evaluate IGCC.

Conventional PC Boiler BACT

SO_2: SPR and the NDEP have proposed wet scrubbing at 95.4% - 96.5% removal,[9] depending upon the averaging period. When burning coal with a sulfur content of 0.8% or less, uncontrolled SO_2 emissions would be about 1.73 lb/mmBtu, and controlled emissions would be limited to 0.06 lb/mmBtu on a 24-hour average basis.

In comparing the performance of SO_2 scrubbers, one must consider that it is easier to achieve a higher control efficiency on a gas stream with a higher inlet SO_2 concentration, but more difficult to achieve a lower outlet concentration. So, if one can achieve a lower outlet concentration on a "dirtier" gas stream, it would indicate a higher degree of scrubbing success. We have identified in Table 1 two projects (FPL-Glades and Taylor) proposing to burn coals with higher uncontrolled SO_2 emissions but with much lower controlled emissions. The uncontrolled emission rates (bolded values) in Table 1 (attached) are derived from the sulfur and heat contents of the coals burned, as well as the uncontrolled emission factors from EPA's "Compilation of Air Pollutant Emission Factors" (AP-42).[10] For example, if EEC were to achieve the same 98.7% SO_2 control as the Glades ultra-supercritical PC proposed by FPL, its emissions would be reduced by 33% (or 1,525 tpy).

NO_x: SPR/NDEP have proposed a 24-hour average limit of 0.06 lb/mmBtu for NO_x using Low NO_x Burners and Selective Catalytic Reduction (SCR). We have identified in Tables 2.a. – 2.c. projects proposing to burn coals with lower NO_x emissions. We agree that SCR represents

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[8] American Electric Power-Mountaineer (WV), Southwestern Power Group-Bowie (AZ), Cash Creek (KY), Excelsior Energy-Mesaba (MN), Southern Co.-Orlando (FL), Pacific Mountain Energy Company (WA), Steelhead (IL)

[9] Removal efficiency is to be determined by procedures established in 40 CFR Part 60.49 Da (b)(3) which allows the sulfur concentration at the scrubber inlet to be estimated based upon the sulfur content of the fuel fired. Since about 12.5% of the sulfur in the sub-bituminous coal to be burned at EEC is retained in the ash, the actual control efficiency, the amount of SO_2 removed by the scrubber, is correspondingly less than the removal efficiency. For example, if the sulfur content of EEC's coal were 0.3 %, the 91% removal requirement could be met by controlling 90% of the SO_2 entering the scrubber.

[10] For the sake of consistency, it is assumed that the SO_2 emission factor is dependent upon the coal type, but independent of the boiler type. The natural process of retention of sulfur in the ash is just as fundamental a characteristic of the coal burned as its sulfur content and its heating value. So, bituminous coals would emit 95% of their sulfur content as SO_2, while sub-bituminous coals would emit 87.5%, and lignites 75%.

appropriate control technology, and suggest that NDEP should consider the lower limits proposed by FPL for its Glades project and permitted by Wyoming for Basin Electric's dry Fork project. If EEC were to achieve the 0.05 lb/mmBtu rate proposed for Glades, its emissions would be reduced by 17% (or 635 tpy).

PM_{10}: SPR/NDEP have proposed a three-hour rolling average limit of 0.01 lb filterable PM_{10}/mmBtu and 0.02 lb/mmBtu for filterable and condensable emissions. Based upon the values posted in Table 3, this is as good as any project we have seen and represents BACT.

Sulfuric Acid Mist (H_2SO_4): SPR/NDEP have proposed a three-hour rolling average limit of 0.0004 lb H_2SO_4 /mmBtu, which is much higher than the numerous projects listed in Table 4. NDEP should explain why this project should be allowed to emit almost four times as much sulfuric mist (on a heat input basis) as the Newmont Nevada project.

Mercury (Hg): Although mercury is not subject to PSD, other new PC boiler projects (e.g., Florida Power & Light's 2000 MW Glades project (Please see Table 5.) and Longleaf Energy's 1,200 MW Hilton, GA project) are proposing to inject powdered activated carbon to reduce mercury to about half the federal emission limit.

In summary, we believe that further consideration must be given to IGCC "Clean Coal" combustion technology, and believe that EEC could achieve lower SO_2, NO_x, Hg, H_2SO_4 and PM_{10} emission limits by either choosing an inherently cleaner coal combustion technology or by more effectively using the control technologies chosen for the boiler. Figure 2 illustrates some of the differences between EEC and the FPL Glades project.

Compliance Monitoring

We recommend that the NDEP add a PM_{10} Continuous Emission Monitor (CEM) requirement. For example, the West Virginia Division of Air Quality has included both filterable and condensable PM_{10} in its permit limit for Longview Power. We continue to believe that CEMs are an important tool for monitoring compliance. For that reason, we recommend that EEC install PM CEMs.

Air Quality/ Air Quality Related Values (AQRV) Modeling Analysis

The far field air quality modeling analysis was based on the EPA guideline CALPUFF modeling system. SPR used CALPUFF Version 5.711a and its suite of associated processors. SPR also used several post-processors: CALPOST Version 5.6393 for visibility; and CALSUM and POSTUTIL from the non-guideline VISTAS CALUFF suite. The NPS approves the use of the guideline CALPUFF 5.711a suite as well as the limited use of the VISTAS post-processors due to the fact that the VISTAS versions do contain features that allow easier computation of AQRV impacts. The modeling analysis was generally based on recommendations found in the FLAG document and the EPA Interagency Workgroup on Air Quality Modeling (IWAQM). The years of 2002, 2003, and 2004 were modeled in the analysis. The modeling domain consisted of 111 by 229 three-kilometer grid cells. The receptors in the Class I area Zion NP are based on the NPS receptor data base and the Class II receptors for Great Basin NP are based on a 1.0 kilometer grid developed by SPR.

We attempted to corroborate the results of the SPR CALPUFF analysis, and were unable to do so for the year 2003. For the year 2002, we successfully were able to generate a CALMET year for 8,617 consecutive hours (359 days). However, there were too many missing hours of upper air data on December 26, 2002 to complete the year. Therefore, our results for the year 2002 are based on the run length of 359 days.

For the year 2004, we experienced another problem with the upper air data. In the upper air data from the Mercury Test Site National Weather Service station in Nevada, three of the first ten soundings of April 2004 were missing. Since CALMET would not run with that many missing soundings in a five day period, we created two CALMET data files for April, 2004. The CALMET data file for the first five days of April 2004 was generated with only three upper air stations. The remainder of April, from April 6 thru April 30, was then processed with the four upper air stations. The rest of the 2004 CALMET data was also generated with the four upper air stations. We believe that, although the CALMET files we generated for 2002 and 2004 have small amounts of missing data, this should not significantly affect the modeling results and are therefore two valid years for PSD permitting purposes.

We could not run the 2003 meteorological data to create a useable CALMET file for that year. We not only attempted to generate a 2003 CALMET data file with CALMET 5.53a, which is part of the CALPUFF 5.711a system, but we also tried with other versions of CALMET to no avail. That is, we attempted to exercise the VISTAS version of CALMET, the newest guideline version of CALMET version 5.8, and several other versions of CALMET. All attempts were unsuccessful. We sent several e-mails on and after November 20, 2007 to the SPR consultants requesting either a new set of the raw meteorological data necessary to run CALMET, or the executable CALMET file that was used by the applicant. We did not receive any information on this matter from the SPR consultant. We also contacted the State of Nevada permitting branch, but were told to note this issue in our formal comments, which we are doing as part of this technical support document. As a general comment, the NPS is puzzled how the SPR consultant was supposedly able to run three complete years of CALPUFF/CALMET without running into the same problems discussed above.

Single Source Analysis: Some EEC emission rates were mischaracterized in the modeling conducted by SPR, thus underestimating visibility impacts at Great Basin NP and Zion NP. Table 6 (below) illustrates that SPR modeled more fine PM_{10} and less condensable inorganic PM_{10} (IOR CPM) than NPS believes to be appropriate.

Table 6. EEC Emission rates modeled for 24-hour impacts on visibility

Lb/hr Modeled by	SO2	NOx	Coarse PM10	Fine PM10	EC	IOR CPM	OR CPM	Total PM10
SPR	1045.2	1045.2	87.2	153.4	3.3	68.2	34.8	346.9
NPS	1045.2	1045.2	87.1	83.9	3.2	139.4	34.8	348.4
Proposed permit limits	1045.2	1045.2						348.4

We disagree with SPR's categorization of HCl and HF as Fine (filterable) PM_{10}. Instead we believe that, because of the hygroscopic nature of HCl and HF in the presence of atmospheric water vapor,[11] both should be treated as IOR CPM. By shifting these hygroscopic compounds from the inorganic condensable category to the non-hygroscopic fine particle category, the impacts of these compounds upon visibility are artificially and incorrectly decreased.

In order to account for this error, we conducted a second set of CALPUFF runs for 2002 and 2004 with the speciated PM emissions we thought were more appropriate. We conducted our own modeling analysis, which is presented along with SPR's results below. The impacts to visibility using the NPS emissions and FLAG Method 2 are found in Table 8b, and the results with the NPS emissions and Method 6 and annual natural background are found in Table 10c.[12]

Air Quality Impact Analysis Results

PSD Increment Consumption:

SPR modeled its proposed maximum 24-hour emissions to calculate all impacts except for the three-hour SO_2 impacts. The three-hour SO_2 increments were modeled in separate runs to address the higher short-term emissions. The results of the single source increment impacts are summarized in the Table 7 below. The model predicts concentrations above the three-hour and 24-hour SO_2 Class I significant impact levels for increment consumption at Zion NP. For PM_{10}, NO_x, and annual mean SO_2 concentrations, the maximum impacts are less than their respective significant impact levels. Because the three-hour and 24-hour SO_2 Class I significant impact levels were exceeded, a cumulative CALPUFF modeling analysis was triggered for those pollutants and averaging periods.[13]

Table 7 – SPR's Class I PSD Increment Modeling Results (micrograms per cubic meter)

Pollutant	Significant Level & PSD Increment	Zion National Park
EEC Project Only		
Sulfur dioxide (SO_2)		
3-hour	**1.0**/25	**1.04**
24-hour	**0.2**/5	**0.23**
Annual	0.1/2	0.01
Particulate matter (PM-10)		
24-hour	0.3/8	0.12
Annual	0.2/4	0.004
Nitrogen dioxide (NO_2)		
Annual	0.1/2.5	0.001
Cumulative Impact Modeling		
Sulfur dioxide (SO_2)		
3-hour	25	1.84
24-hour	5	0.53

[11] "Hydrogen Fluoride Study, Final Report, Report to Congress, Section 112(n)(6), Clean Air Act as Amended"
[12] In corroborating the modeling results in the application, we ran CALPUFF for the years 2002 and 2004 with SPR's proposed emissions rates. We calculated results that were very similar in magnitude and frequency for increment, acid deposition impacts, and the unadjusted (no 8^{th} high or weather events) visibility impacts for both Method 2 and Method 6 with annual natural background extinction.
[13] Our results did not differ substantially from those presented by SPR.

Cumulative Analysis: A cumulative analysis of three-hour and 24-hour SO_2 increment consumption at Zion NP was triggered. In conducting this analysis of cumulative SO_2 increment consumption/expansion at Zion NP, it is necessary to determine the Minor Source Baseline Date (MiSBD) for Zion for SO_2 for each applicable averaging period; this becomes the reference date for determining changes in emissions. According to SPR, the MiSBD for Zion NP is April 1, 1990. However, we believe that the MiSBD for Utah (and Zion) was triggered much earlier when PSD permits were issued by Utah in 1980 for the Intermountain Power and Hunter #3 projects.[14] In that case, SPR's analysis is invalid, and NDEP must determine the correct MiSBD for Zion and SPR must re-do the cumulative increment analysis on that revised basis.

SPR does not describe how the emission rates in its Table 3-5. "Regional SO2 Emission Source Inventory" were derived, but presents results which purport to show that the increments are not exceeded at Zion NP. However, no explanation was provided telling from what year(s) the inventory was derived, and we cannot confirm that it was done correctly. For example, we have the following questions and concerns about the inventory as presented:

- Why were Intermountain Power units #1 & #2 excluded, while Unit #3 was included? Units #1 & #2 exhaust through a common stack located at the same facility, have similar emissions, and consume increment.
- SPR modeled 857.2 lb/hr for Reid Gardner Unit #2 for both three-hour and 24-hour increment consumption. However, on March 20, 2005, Reid Gardner Unit #4 emitted SO_2 at a three-hour average rate of 1101 lb/hr. On June 3, 2003, Reid Gardner Unit #4 emitted SO_2 at a 24-hour average rate of 873 lb/hr. On June 5, 2006, Reid Gardner Unit #4 emitted SO_2 at a three-hour average rate of 1834 lb/hr. SPR should have modeled these higher rates.

EEC should provide information on the relevant MiSBDs and how emissions changes were determined relative to those dates.

Full Impact Analysis

Since, according to SPR, the "EEC project is expected to induce a small amount of growth in the air basin", no secondary emissions were included in the analysis.

Air Quality Related Values (AQRVs)

Visibility

Great Basin NP has some of the best visibility in the 48 contiguous states. Nationwide studies indicate that the intermountain West enjoys the best visibility in the coterminous U.S., from the southern Cascades, eastward across the Great Basin and Snake River Plain, to the northern Colorado Plateau and central Rocky Mountains. Great Basin NP, which is located in middle of this region and has been monitoring visibility since 1982, typically records some of the highest

[14] Because the MiSBD is triggered when the first PSD application is deemed complete by the permitting authority, it would have been triggered before these permits were issued.

average visibility readings in the nation, along with: Denali NP, Alaska; Jarbridge Wilderness Area, Nevada; and Bridger National Forest, Wyoming.[15] According to our FLAG guidance:

> If the visibility impact of a proposed source is less than a 5% change in extinction a cumulative analysis would not be expected. For visibility impairment predicted to be above 5%, but less than 10%, change in extinction from a proposed source, a cumulative analysis is expected. If the visibility impairment is predicted to be greater than 10% from a proposed source, the FLM is likely to object to the project regardless of other source growth, unless there is mitigation.

SPR performed several visible haze impact analyses with three different methodologies for both Great Basin NP and Zion NP. SPR conducted the standard FLAG 2000 methodology known as Method 2 where the relative humidity values are used from the actual meteorological data and the background extinction is based on average annual conditions. Note that, for the Great Basin NP analysis, the background extinction conditions for the nearest Class I area, Jarbridge Wilderness Area were applied as the values for Great Basin NP. In its Method 2 analysis, SPR attempted to dismiss some of its impacts at Zion NP and Great Basin NP due to "weather events". The Federal Land Managers do not accept the elimination of visible impact days based on perceived weather obscuration. The PSD application reported visibility impact results for the EEC by itself over the three-year modeling period. Those results are shown in Table 8.a. below for the approach recommended by our FLAG guidance.

Table 8.a. –SPR Visibility Modeling Results using FLAG Method 2

EEC Project Only	Great Basin National Park	Zion National Park
Maximum Change in Extinction	68.8%	30.8%
Days over 5%	**206**	**17**
Days over 10%	**104**	**4**

Due to our concerns about the way in which SPR characterized particulate emissions from EEC, we conducted a modeling analysis using values for particulate emissions that we believe are more representative of the behavior of those emissions. Because we could not get the modeling files provided by SPR to work for 2003, and because NDEP refused to address this issue, we are presenting data in Table 8.b. based upon only 2002 and 2004 meteorology.

Table 8.b. NPS' Predicted Visibility Impairment due to EEC Alone

National Park	Great Basin National Park			Zion National Park		
Year modeled using Method 2	2002	2003	2004	2002	2003	2004
# day with change in extinction > 5%	**77**		**69**	**4**		**7**
# day with change in extinction > 10%	**38**		**33**	**1**		**3**
Maximum change in extinction	73%		86%	31%		15%

According to the results from analyses by both SPR and NPS, the 5% "cumulative analyses" and the 10% "likely to object" thresholds are exceeded at Zion NP and Great Basin NP. Furthermore, the impacts at Great Basin NP are the most severe we have ever encountered regardless of which set of results are analyzed. Thus, the predicted impacts on visibility at Great Basin fall well

[15] The haziest days at GRBA are cleaner than any national park unit where visibility is measured, except for Denali National Park and Preserve in Central Alaska.

beyond the range of previous adverse impact determinations made by the FLM, and are not insignificant at Zion NP.

We are also concerned about the cumulative impacts from the EEC project and the proposed White Pine coal-fired power plant proposing to locate some 30 miles north-northwest from the EEC project. Since SPR did not conduct a cumulative analysis of visibility impacts, and the Ely area may experience the addition of two large coal-fired power plants, we conducted an analysis of the cumulative impacts on visibility at Great Basin NP and Zion NP. The results of our analysis are presented below.

A cumulative CALPUFF analysis was conducted using the SPR 2002 and 2004 CALMET data along with the NPS emission estimates of emissions from the proposed SPR generating station and the proposed White Pine power plant. The stack parameters and location of the proposed White Pine Power Plant were obtained from its recent permit application submittal. The results of our Method 2 analysis are found in Table 9.

Table 9. NPS' Cumulative Visibility Impairment due to EEC + White Pine

National Park	Great Basin National Park			Zion National Park		
Year modeled using Method 2	2002	2003	2004	2002	2003	2004
# day with change in extinction > 5%	133		105	17		12
# day with change in extinction > 10%	**85**		**64**	**5**		**8**
Maximum change in extinction	103%		197%	48%		28%

The predicted impacts on visibility at Great Basin again fall well beyond the range of previous adverse impact determinations made by the FLM, and are within the range of impacts at Zion NP that has previously been considered adverse when attributed to a single source.

The FLMs are considering changes to their FLAG guidance that would incorporate EPA's visibility modeling methods used in its Best Available Retrofit Technology (BART) program. EPA recommends the use of its "Method 6" for the BART analysis, using either the 20% best visibility days or the annual average visibility as alternative background visibility values. To provide additional information, SPR conducted a second type of visibility analysis where it applied the background extinction of the 20% best natural days and monthly average relative humidity. In both of methods presented below, the threshold for "contributing" to visibility impairment is eight days in any one year with greater than five percent change in light extinction. Exceeding this threshold would typically mean that additional emission control measures should be considered. The threshold for "causing" visibility impairment is eight days in any one year with greater than ten percent change in light extinction.

In this supplemental analysis, SPR reported on the 98th percentile impacts (8th high per year) and also attempted to dismiss some of the impacts based on weather events. The FLMs do not allow the 98th percentile impacts per year as a cut off, but require that all impacts greater than a 5% change in extinction be reported. The proposed use of weather events to dismiss days of visibility impacts is illogical since the monthly relative humidity is based on a 30-year climatic average and weather events are already accounted for in the monthly average data. These results are found in Table 10a below.

Table 10.a. –SPR's Visibility Modeling Results using Method 6 and 20% Best Background Days

EEC Project Only	Great Basin National Park	Zion National Park
Maximum Change in Extinction	24.5%	3.6%
Days over 5%	**244**	0
Days over 10%	112	0

The third visible haze analysis for supplemental information was similar to the second analysis except it used the annual average natural background extinction and the monthly average relative humidity and reported the 8th high per year. Here, too, the FLMs require that all impacts with greater than a 5% change in extinction be reported. As stated earlier, the proposed use of weather events to dismiss days of visibility impacts is illogical since the monthly relative humidity is based on a 30-year climatic average and weather events are already accounted for in the monthly average data. These results are found in Table 10.b. below.

Table 10.b. –SPR's Visibility Modeling Results using Method 6 and Annual Average Background

EEC Project Only	Great Basin National Park	Zion National Park
Maximum Change in Extinction	18.8%	2.8%
Days over 5%	**194**	0
Days over 10%	72	0

SPR's results from each of these analyses show that EEC's impacts would be below the pertinent 10% and 5% change in extinction impact thresholds at Zion NP, but far above them at Great Basin NP. Similar results were obtained by NPS for 2002 and 2004 using the annual average visibility as background and are presented in Table 10.c.

Table 10.c. –NPS' Visibility Modeling Results using Method 6 and Annual Average Background

National Park	Great Basin National Park			Zion National Park		
Year modeled using Method 6	2002	2003	2004	2002	2003	2004
# day with change in extinction > 5%	**93**		**68**	1		3
# day with change in extinction > 10%	35		33	1		1
Maximum change in extinction	36%		62%	12%		11%

Regardless of the method used, EEC would cause unacceptable visibility impairment at Great Basin NP.

Deposition

Acid deposition harms aquatic and terrestrial life through direct contact and by changing the chemistry of surface water and soils. It can affect plants' seed germination and survival. Even dry acid deposition builds up on hairy surfaces of desert plants. Later dew or precipitation dissolves the deposition to form concentrated acid solutions that can harm foliage. Acid deposition is often accompanied by nitrogen deposition, which is an artificial fertilization which can favor certain plants over others and change the plant community structure. Acid deposition occurs when SO_2 and NO_x gases chemically change to sulfuric and nitric acid in the atmosphere and fall to the earth with rain and snow (wet deposition), or with dust and microscopic particles (dry deposition).

SPR correctly conducted acid deposition analyses for total sulfur and total nitrogen at both Great Basin NP and Zion NP for all three years. At Zion National Park, the modeled deposition rates (Please see Table 11.) are predicted to be below the 0.005 kilograms per hectare per year (kg/ha/yr) Deposition Analysis Thresholds (DATs)[16] for sulfur and nitrogen during each of the three years modeled.[17]

Table 11. –Deposition Modeling Results (kg/ha/yr)

	Deposition Analysis Threshold	Zion National Park	Great Basin National Park
EEC Project Only			
Sulfur	**0.005**	0.003	**0.085**
Nitrogen	**0.005**	0.002	**0.042**

However, at Great Basin NP, modeled deposition rates for both sulfur and nitrogen exceed our DATs and may contribute to acidification or eutrophication (unwanted enrichment) of aquatic and terrestrial ecosystems. Nitrogen and sulfur compounds can acidify poorly buffered soils, lakes, and streams. Lakes in Great Basin NP were surveyed in 1989 as part of EPA's National Surface Water Survey. All of the lakes in the park were considered acid-sensitive (acid neutralizing capacity, ANC, of less than 200 microequivalents per liter – ueq L^{-1}), according to EPA's classification criteria. The most sensitive lake included in the study was Baker Lake at 3,238 m (10,620 feet), with an ANC of 73 μeq L^{-1}. ANC has not been directly measured in the park recently, but can be inferred from conductivity measurements that indicate that the ANC of Baker Lake is, at times, less than 50 μeq L^{-1}, a level considered to be very acid-sensitive. An increase in acidic deposition from EEC could further deplete ANC, increasing the risk to lakes and streams in the park from episodic or chronic acidification. Impacts would be understated due to the additional acidic deposition associated with the proposed White Pine project. Baker Lake has a population of cutthroat trout (*Onchorhynchus clarki*), as well as other fish and invertebrates that would be negatively affected by acidification.

In addition to contributing to acidification, sulfur deposition contributes to the formation of methylmercury in the environment, if mercury is present. Methylmercury is extremely toxic and bioaccumulates in fish and wildlife, affecting health and reproduction. Because mercury emissions from the project are estimated at 260 lb/yr, the resulting increase in mercury deposition, coupled with the significant increase in sulfur deposition could impact park resources.

Aquatic and terrestrial ecosystems in Great Basin NP may also be sensitive to the enrichment effects of nitrogen deposition. In certain aquatic ecosystems, including high-elevation, low-nutrient lakes, excess nitrogen causes changes in algal species composition and abundance. Nitrogen-induced changes in aquatic community structure has been documented in a number of

[16] NPS has developed deposition analysis thresholds to evaluate new sources of air pollution. Predicted deposition impacts below the thresholds are considered insignificant (http://www2.nature.nps.gov/air/Pubs/pdf/flag/nsDATGuidance.pdf).
[17] Our results did not differ substantially from those presented by SPR.

western lakes, including lakes in Rocky Mountain NP[18] (Colorado) and the Sierra Nevada[19], and Beartooth Lake[20] (Wyoming). Other symptoms of nitrogen enrichment include loss of water clarity and loss of dissolved oxygen. In terrestrial ecosystems, excess nitrogen affects soil nutrient cycling and plant community structure and function. Nitrogen has been found to favor invasive plant species in certain ecosystems, allowing them to out-compete native plants. Plant communities in high-elevation areas are at particular risk, as their short growing seasons limit the amount of nitrogen that can be utilized. Experiments in Colorado have found that even low amounts of nitrogen deposition can significantly alter alpine plant communities.[21] Nitrogen also increases plant biomass, resulting in greater fuel loadings and fire potential. In certain high-elevation forests, nitrogen decreases the cold hardiness of trees, leading to winter die-offs.

Current nitrogen deposition in Great Basin NP is approaching the level at which negative ecosystem impacts might be expected to occur. For example, nitrogen wet deposition (snow and rain) rates of 1.4-1.6 kilograms per hectare per year (kg/ha/yr) induced ecosystem changes in high-elevation lakes in Rocky Mountain NP.[22] Average annual wet nitrogen deposition in Great Basin NP is currently 1.35 kg/ha/yr (2000-2006 average).[23] EEC's predicted contribution to deposition will increase nitrogen deposition in the park to approximately 1.4 kg/ha/yr, the level at which high-elevation lakes in Rocky Mountain NP began to be impacted.

Conclusions: EEC's emissions have the potential to increase nitrogen and sulfur deposition in Great Basin NP to harmful levels. Therefore, as discussed above, EEC should reduce its NO_x and SO_2 emissions as much as possible.

Ozone

Ozone is formed in the atmosphere by reactions of hydrocarbons and nitrogen oxides. EEC would be a major emitter of nitrogen oxides and my exacerbate ozone levels at Great Basin NP. The metric for comparing ozone concentrations against the National Ambient Air Quality Standard is calculated as the three year average of the 4th highest eight-hour average ozone concentration. Using this metric, ozone concentrations measured at Great Basin NP are high for a rural area at 72 parts per billion (ppb). Currently an exceedance of the standard occurs at 85 ppb. However, EPA is evaluating the current standard and is likely to lower the value. The

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[18] Baron J.S., Rueth H.M., Wolfe A.M, Nydick K.R., Allstott E.J , Minear J.T., Moraska B. 2000. Ecosystem responses to nitrogen deposition in the Colorado Front Range. Ecosystems 3: 352–368.

[19] Sickman JO, Melack JM, Clow DW. 2003. Evidence for nutrient enrichment of high-elevation lakes in the Sierra Nevada, California, USA. Limnology and Oceanography 48: 1885-1892.

[20] Saros, Jasmine E; Interlandi, Sebastian J; Wolfe, Alexander P, and Engstrom, Daniel R. 2003. Recent Changes in the Diatom Community Structure of Lakes in the Beartooth Mountain Range, USA. Arctic, Antarctic, and Alpine Research. 35(1):18-23.

[21] Bowman WD. 2000. Biotic controls over ecosystem response to environmental change in alpine tundra of the Rocky Mountains. Ambio 29: 396–400.

[22] Baron, J.S. 2006. Hindcasting nitrogen deposition to determine an ecological critical load. Ecological Applications 16:433-439.

[23] Data from the National Atmospheric Deposition Program at http://nadp.sws.uiuc.edu/.

proposed new standard could be as low as 70 ppb. If it is lowered to that level, the park will be in non-attainment status for ozone. Analyses have not been conducted to verify the effect on ozone concentrations, but elevated ozone levels should be a concern for air quality management in the region. In addition to being a concern for human health, ozone can harm plants. Ozone can cause foliar injury to sensitive plants and can reduce plant growth and health. Several species of plants in Great Basin NP are known to be sensitive to ozone, including quaking aspen, ponderosa pine, serviceberry, skunkbush, and evening primrose.

Procedural Concerns

We are concerned that the NDEP did not follow proper procedures regarding publication of its Public Notice of the EEC application. 40CFR51.166 (q) regarding public participation states that the reviewing authority shall (iii) "Notify the public, by advertisement in a newspaper of general circulation in each region in which the proposed source would be constructed… the degree of increment consumption that is expected from the source or modification…" Although the EEC project would significantly impact increment at Zion NP, NDEP provided no information regarding any increment consumption in the Class I area. Because NDEP did not provide in its Notice to the public the degree of increment consumption in each affected Class I area, it failed to properly advise the public of the impacts in these sensitive areas.

We are also concerned that NDEP did not provide "all information relevant to the permit application within 30 days of receipt of and at least 60 days prior to public hearing by the State on the application for permit to construct. Such notification must include an analysis of the anticipated impacts on visibility in any Federal Class I area," as required by 40CFR51.307, when it denied our request for the files necessary to model the impacts of the EEC project using 2003 meteorological data, as discussed above.

Potential Mitigation Measures

In addition to reducing emissions from EEC as proposed above, it may be possible that sufficient emission reductions could be secured from other sources in the area to further mitigate EEC's impacts at Great Basin and Zion National Parks.

Conclusions and Recommendations

- EEC should re-consider use of IGCC technology to utilize coal to produce energy with less pollution.
- EEC has not justified its need for a NO_x limit that is higher than 0.05 lb/mmBtu.
- EEC has not justified its need for a SO_2 limit that is higher than the examples cited in this report.
- The modeling analysis for Class I cumulative SO_2 increment consumption at Zion NP was done incorrectly. The air pollutant dispersion modeling analyses presented to date indicate that EEC would have a significant impact on the three-hour and 24-hour SO_2 increments at Zion National Park. EEC should provide information on the relevant Minor Source Baseline Dates and how emissions changes were determined relative to those dates. No explanation was provided as to what year(s) its cumulative SO_2 inventory was derived from, or how emission rates were determined.

- Visibility impacts at Zion NP from EEC alone are not insignificant, and the combined impacts from EEC and the White Pine project and are within the range of impacts at Zion NP that has previously been considered adverse when attributed to a single source.
- Acid deposition at Zion NP from EEC alone would be below our thresholds of concern.
- Both sulfur and nitrogen deposition from EEC exceed our DATs at Great Basin NP, with potential impacts to aquatic and terrestrial ecosystems. Sensitive high-elevation aquatic and terrestrial ecosystems in Great Basin NP may be impacted by additional sulfur, nitrogen, and mercury deposition from EEC.
- Visibility impacts at Great Basin NP are the most severe we have ever encountered. Thus, the predicted impacts on visibility at Great Basin fall well beyond the range of previous adverse impact determinations made by the FLM.
- NDEP did not follow proper procedures regarding publication of its Public Notice.
- NDEP did not provide “all information relevant to the permit application” as required by 40CFR51.307.

Table 1.a. SO2 Rankings (1- & 3-hr averaging periods)

SO2				Issue/Op	Boiler		Coal Quality				Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	Year	%S	(Btu/lb)	(lb/mmBtu)	Year	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Sierra Pacific-Ely		application	NV		PC		0.8	8100	**1.728**		2x750	1500	17420	0.080	1394	0.93	3	LSD	95.4%
FPL-Glades		application	FL		PC	[redacted]	1.98	12324	**3.053**	[redacted]	2x980	1960	17400	0.065	1131	0.58	3	WLS	97.9%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 1.b. SO2 Rankings (24-hr averaging period)

SO2				Issue/Op	Boiler		Coal Quality				Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	Year	%S	(Btu/lb)	(lb/mmBtu)	Year	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Sierra Pacific-Ely		application	NV		PC		0.8	8100	**1.728**		2x750	1500	17420	0.060	1045	0.70	24	LSD	96.5%
FPL-Glades		application	FL		PC		1.98	12324	**3.053**		2x980	1960	17400	0.040	696	0.36	24	WLS	98.7%
Taylor		application	FL			[redacted]	3.46	7475	**8.100**	[redacted]	800	800	7475	0.055	411	0.51	24	WLS	99.3%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 1.c. SO2 Rankings (30-day averaging period)

SO2				Issue/Op	Boiler		Coal Quality				Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	Year	%S	(Btu/lb)	(lb/mmBtu)	Year	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Navajo	2	operating	AZ		PC	2000	0.53	10919	**0.922**	2001	803		8563	0.044	323		720	WLS	95.5%
Sierra Pacific-Ely		application	NV		PC		0.8	8100	**1.728**		2x750	1500	17420	0.060	1045	0.70	720	LSD	96.5%
FPL-Glades		application	FL		PC		1.98	12324	**3.053**		2x980	1960	17400	0.040	696	0.36	720	WLS	98.7%
Taylor		application	FL			[redacted]	3.46	7475	**8.100**	[redacted]	800	800	7475	0.040	299	0.37	720	WLS	99.5%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 1.d. SO2 Rankings (Annual averaging period)

SO2				Issue/Op	Boiler		Coal Quality				Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	Year	%S	(Btu/lb)	(lb/mmBtu)	Year	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Sierra Pacific-Ely		application	NV		PC		0.8	8100	**1.728**		2x750	1500	17420	0.060	1045	0.70	8760	LSD	96.5%
FPL-Glades		application	FL		PC	[redacted]	1.98	12324	**3.053**	[redacted]	2x980	1960	17400	0.040	696	0.36	8760	WLS	98.7%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 2.a. NOx Rankings (1, 3 & 24-hr averaging periods)

NOx				Issue/Op	Boiler	Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
FPL-Glades		application	FL		PC	2x980	1960	17400	0.05	847	0.43	24	SCR	87.7%
Cash Creek		application	KY		DB-PC	2x500	1000	9652	0.05	483	0.48	24	LNB/OFA/SCR	88.8%
LG&E-Trimble County		application	KY		PC	750		6942	0.05	348	0.46	24	SCR	86.1%
Sierra Pacific-Ely		application	NV		PC	2x750	1500	17420	0.060	1045	0.70	24	SCR	90.3%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 2.b NOx Rankings (720-hr averaging periods)

NOx				Issue/Op	Boiler	Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Black Hills Pwr-WYGEN 3		issued	WY	2/5/2007	PC	100		1300	0.05	65	0.65	720	LNB/SCR	89.3%
FPL-Glades		application	FL		PC	2x980	1960	17400	0.05	870	0.44	720	SCR	87.7%
Cash Creek		application	KY		DB-PC	2x500	1000	9652	0.05	483	0.48	720	LNB/OFA/SCR	88.8%
Basin Elec--Dry Fork		permit	WY	10/15/07	PC	385	385	3801	0.050	190	0.49	720	LNB/SCR	92.2%
Sierra Pacific-Ely		application	NV		PC	2x750	1500	17420	0.060	1045	0.70	720	SCR	90.3%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 2.c. NOx Rankings (8760-hr averaging periods)

NOx				Issue/Op	Boiler	Capacity			Emissions or Limits*			Period	Control	
Facility Name	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
FPL-Glades		application	FL		PC	2x980	1960	17400	0.050	870	0.44	8760	SCR	88%
Cash Creek		application	KY		DB-PC	2x500	1000	9652	0.050	483	0.48	8760	LNB/OFA/SCR	88.8%
Sierra Pacific-Ely		application	NV		PC	2x750	1500	17420	0.050	871	0.58	8760	SCR	91.9%

* Actual emissions from existing sources or proposed or permited limits for new sources

Table 3. PM10 Rankings

PM10									Emission Limits							
				Issue	Boiler		Capacity		Filterable			Period	Control		Total	
Facility Name/Location	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)	(lb/mmBtu)	(lb/hr)
Sithe-Toquop		application	NV		PC	750	750	6048	0.010	60	0.08		FF		0.030	181
Sithe-Desert Rock		application	NEPA		PC	750	1500	13600	0.010	136.0	0.09	3	FF		0.020	272.0
Two Elk Expansion		application	WY		PC	750	750	6285	0.010	63	0.08		FF			
Sierra Pacific-Ely		application	NV		PC	2x750	1500	17420	0.010	174.2	0.12		FF		0.020	348

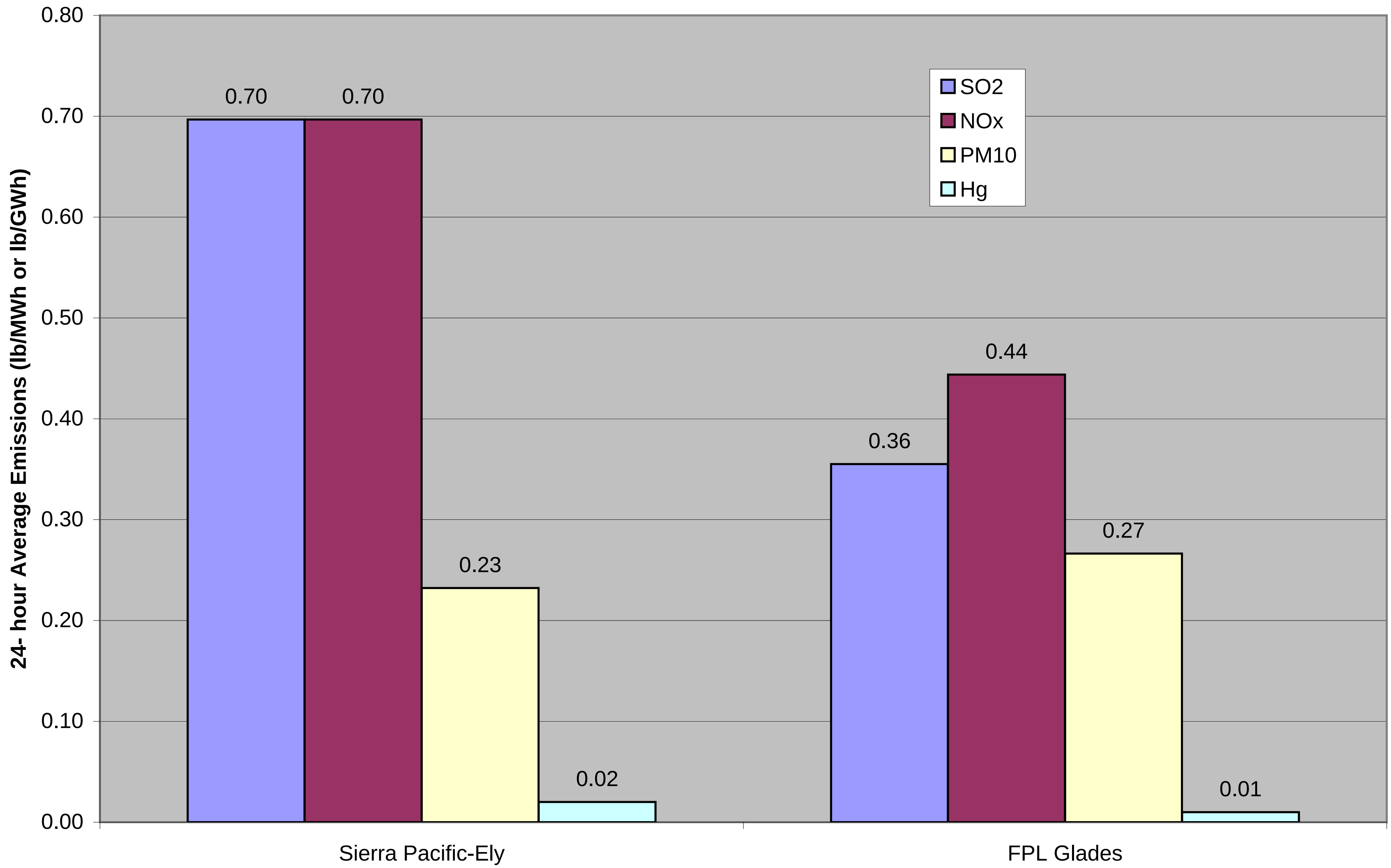
Table 4. H2SO4

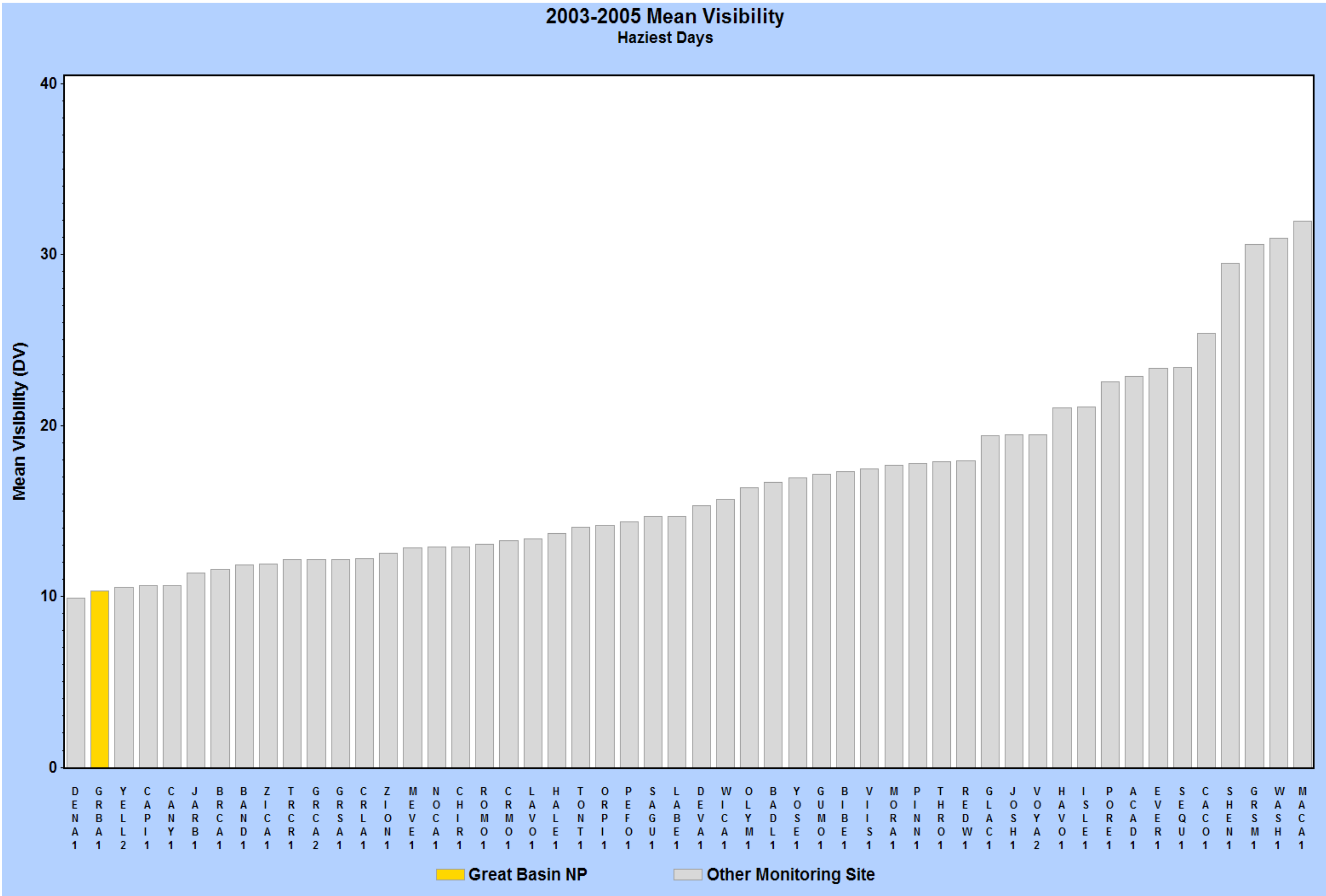
H2SO4				Issue	Boiler	Capacity			Emission Limits			Period	Control	
Facility Name/Location	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/hr)	(lb/MW)	(hr)	Type	(%)
Newmont Nevada		issued	NV	5/5/2005	PC	200	200	2030	0.00102	2.1	0.010	24	LSD	
Cash Creek		application	KY		DB-PC	2x500	1000	9652	0.00133	12.8	0.013	720	WLS	
Basin Electric--Dry Fork		permit	WY	########	PC	385	385	3801	0.0025	9.5	0.025	720	CDS	
Black Hills Pwr-WYGEN 3		issued	WY	2/5/2007	PC	100		1300	0.0027	3.5	0.035	720	LSD	
LS Power-White Pine		draft permit	NV		PC	3x530	1590	15648	0.0034	53	0.033	3		
LS Pwr--High Plains	1	application	CO		PC	600	600	6155	0.0034	21	0.035	3	LSD	
Black Hills Pwr-Wygen2		issued	WY		PC	100		1300	0.00370	4.8	0.048	720	LSD	

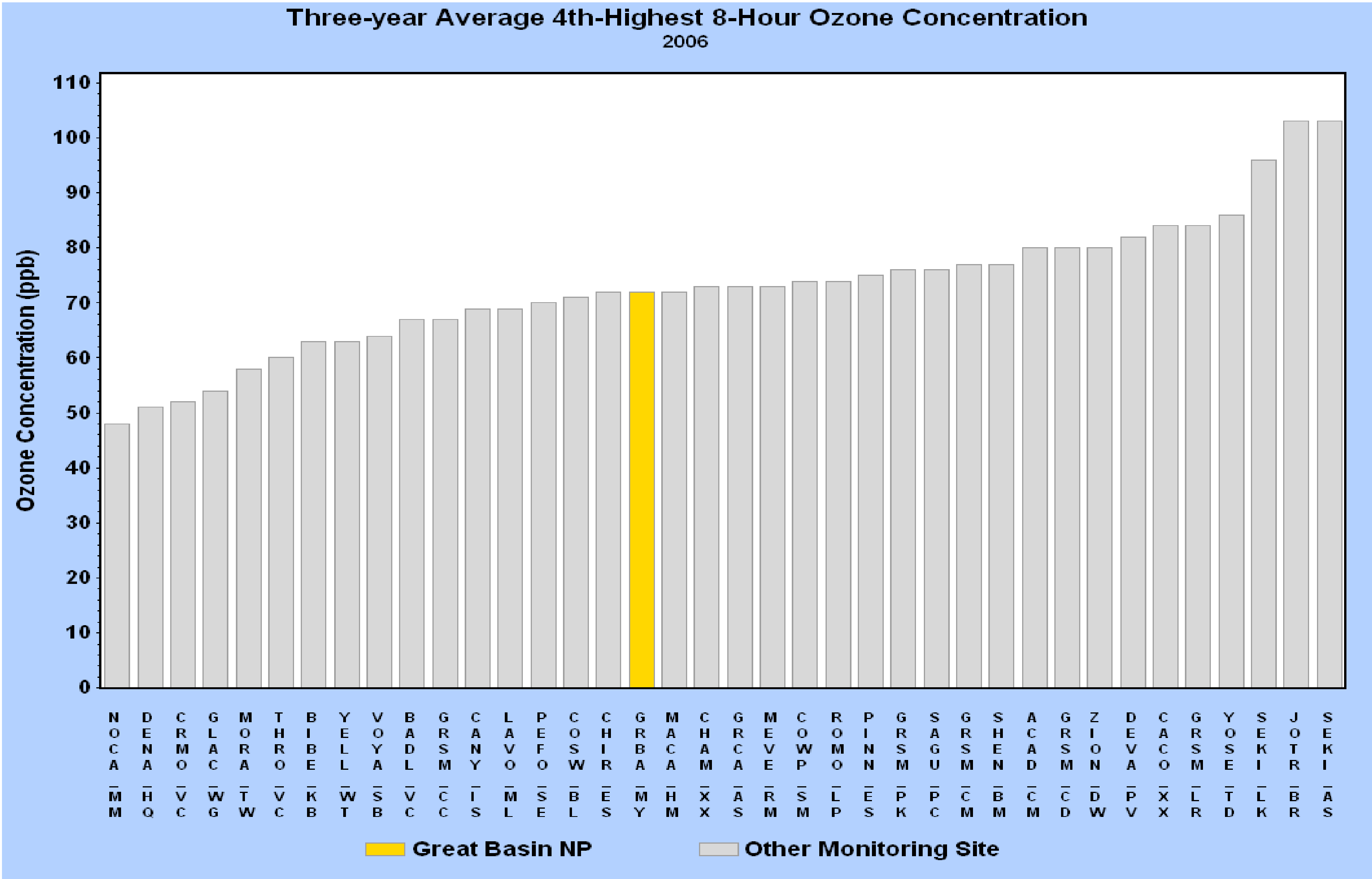
Table 5. Hg

Hg				Issue	Boiler	Capacity			Emission Limits			Period	Control	
Facility Name/Location	Unit	Status	Permit #	Date	Type	MW	Total	(mmBtu/hr)	(lb/mmBtu)	(lb/(MWh)	(lb/yr)	(hr)	Type	(%)
FPL-Glades		application	FL		PC	2x980	1960	17400	1.1E-06	9.9E-06	170		PAC	
Sierra Pacific-Ely		application	NV		PC	2x750	1500	17420	1.7E-06	2.00E-05	263			

Figure 2. PC Emissions




2003-2005 Mean Visibility
Haziest Days
Mean Visibility (DV)
0
10
20
30
40
DENA1
GRBA1
YELL2
CAPI1
CANY1
JARB1
BRCA1
BAND1
ZICA1
TRCR1
GRCA2
GRSA1
CRLA1
ZION1
MEVE1
NOCA1
CHIR1
ROMO1
CRMO1
LAVO1
HALE1
TONT1
ORPI1
PEFO1
SAGU1
LABE1
DEVA1
WICA1
OLYM1
BADL1
YOSE1
GUMO1
BIBE1
VIIS1
MORA1
PINN1
THRO1
REDW1
GLAC1
JOSH1
VOYA2
HAVO1
ISLE1
PORE1
ACAD1
EVER1
SEQU1
CACO1
SHEN1
GRSM1
WASH1
MACA1
Great Basin NP
Other Monitoring Site



Three-year Average 4th-Highest 8-Hour Ozone Concentration
2006
Ozone Concentration (ppb)
0
10
20
30
40
50
60
70
80
90
100
110
NOCA_MM
DENA_HQ
CRMO_VC
GLAC_WG
MORA_TW
THRO_VC
BIBE_KB
YELL_WT
VOYA_SB
BADL_VC
GRSM_CC
CANY_IS
LAVO_ML
PEFO_SE
COSW_BL
CHIR_ES
GRBA_MY
MACA_HM
CHAM_XX
GRCA_AS
MEVE_RM
COWP_SM
ROMO_LP
PINN_ES
GRSM_PK
SAGU_PC
GRSM_CM
SHEN_BM
ACAD_CM
GRSM_CD
ZION_DW
DEVA_PV
CACO_XX
GRSM_LR
YOSE_TD
SEKI_LK
JOTR_BR
SEKI_AS
Great Basin NP
Other Monitoring Site